PLASKOLITE

BUILDING CODES AND FLAMMABILITY

BACKGROUND

Plastic building materials in commercial and residential buildings, can at times, offer superior performance due to outstanding impact and strength, lightweight, electrical insulation, high thermal resistance and flame inhibiting characteristics. These materials can be found in walls, roof, ceiling, doors, attics, crawlspaces, interior signs, finish and trim work, light covers and other areas represented by traditional building materials. However, in the presence of an ignition source and given sufficient time and high temperatures, plastics will ultimately burn. Consequently, polycarbonate materials used in building construction frequently contain fire-inhibiting compounds to mitigate flame spread and smoke development.

There are numerous local, state and national building codes that have rules dealing with how and where plastic building materials may be used. These codes set limits for allowable flame spread and smoke development for interior walls, ceiling finishes and ceiling trim based on location and occupancy classification.

In 1994, a single set of comprehensive and coordinated national construction codes was established. Brief reviews of the requirements of plastic building products, found in commercial buildings, are outlined below:

THE INTERNATIONAL CODE COUNCIL (ICC)

The International Code Council (ICC) is dedicated to develop codes and standards used in the design, build and compliance processes to construct safe, sustainable, affordable and resilient structures. Most U.S. communities and many global markets have adopted the international codes.

Specifically, ICC codes are a set of comprehensive, coordinated, building safety and fire prevention codes. Building codes benefit public safety and support the industry's need for a universal set of codes without local or regional limitations.

The fifty states and the District of Columbia have adopted ICC codes. Federal agencies including the Architect of the Capitol (AOC), General Services Administration (GSA), National Park Service (NPS), Department of State (DoS), U.S. Forest Service (USFS) and the Veterans Administration (VA) adhere to and enforce ICC Codes.

The Department of Defense (DoD) references the **International Building Code** for constructing military facilities, including those that house U.S. troops at home and abroad.

Source: About ICC

THE INTERNATIONAL BUILDING CODE (IBC)

The International Building Code (IBC) is developed by the International Code Council (ICC). The building code has no legal status until it is adopted or adapted by government regulation. The IBC provides minimum standards for building construction to ensure the public health, safety and welfare.

The IBC was developed to consolidate existing building codes into one national and international uniform code. It is used to regulate building construction through the use of standards and is a reference for architects and engineers when designing structures or building systems.

Chapters in the IBC dealing with plastics include: Chapter (8) Interior Finishes, (24) Glass and Glazing and (26) Plastic.

Chapter 8 (Interior finishes)

Provisions of this chapter govern the use of materials used as **interior finishes**, trim and decorative materials as they relate to fire performance and smoke development. Public codes 2009 Chapter 8

Chapter 24:

Provisions of this chapter govern plastic glazing that shall meet the weathering requirements of ANSI Z97.1. Public codes 2009 Chapter 24

Chapter 26: (Exterior finishes)

These provisions govern the materials, application, construction, design and installation of foam plastic, foam plastic insulation, plastic veneer, interior plastic finish and trim and light-transmitting plastics. Public codes 2009 Chapter 26

ICC EVALUATION SERVICE (ICC-ES)

The ICC Evaluation Service (ICC-ES) is a nonprofit company that conducts technical evaluations of building products, components, methods, and materials. Evaluation reports from ICC Evaluation Service are used as a resource by code officials to verify building products comply with code requirements.

Covestro LLC tested TUFFAK® products under ASTM E84 and report results can be found here: ICC-ES Report-2728 ICC-ES Report ESR-2728.pdf

Information on how to read and interpret an ICC-ES report: ICC-ES Evaluation Reports

TYPICAL INDOOR RATINGS - Flammability & Class Ratings

Flame spread and smoke developed values for products are tested in accordance with UL 723 (also known as ASTM E84, & NFPA 255) Test for Surface Burning Characteristics of Building Materials.

Class A Rating: Covestro LLC UL 723 rating for **GP-V** can be found here:

- UL723 File #R21646: Surface Burning

	TUFFAK GP-V polycarbonate sheet 0.060 to 0.250 in. thick
Flame spread	5*
Smoke developed	75*

* Flame spread and Smoke developed recorded while material remained in original test position. Once heated, the test specimen softened and fell out of the test position to the floor of the chamber. Ignition of molten residue on the furnace floor resulted in flame travel equivalent to calculated Flame Spread Classification of 55 and Smoke Developed Classification of over 500.

The International Building Code (IBC) Report has established three classifications to their rating system:

Class A (also referred to as **Class 1**) : ≤25 Flame Spread Index (FSI)

Class B (**Class 2**) : ≤75 Flame Spread (FSI)

Class C (**Class 3**) : ≤200 Flame Spread (FSI)

All classes list a Smoke Developed Index (SDI) of ≤450

The calculated Flame Spread Index is a relative indication of flammability for the test material with respect to a red oak standard. The rate and distance the flame spread travels are considered part of the flame spread index. A reported flame spread index of “25” indicates a material has approximately 25 percent of the red oak standard’s flame spread characteristics. The “smoke developed index” is calculated similarly.

TYPICAL OUTDOOR RATINGS - Flammability & Class Ratings

The ICC-ES Report has two combustibility classifications in their rating system for outdoor structures attached to buildings (e.g. canopies, awning, patio covers, skylights and similar structures):

Class CC1: Plastic materials that have a burning **extent** of 1 inch (25 mm) or less, when tested at a nominal thickness of 0.060 inch (1.5 mm), or in the thickness intended for use, in accordance with ASTM D 635 and the next lesser rating is Class CC2.

Class CC2: Plastic materials that have a burning **rate** of 2.5 inches per minute (1.06 mm/s) or less, when tested at a nominal thickness of 0.060 inch (1.5 mm), or in the thickness intended for use, in accordance with ASTM D 635.

[ASTM D 635 - A flammability test used to determine the relative burn rate of self-supporting plastics. This reports a rate of burning and/or extent and time of burning of self-supporting plastics in a horizontal position.]

TUFFAK PRODUCT RATING ACCORDING TO ICC-ES

PARAMETER	MAKROLON MODELS					
	GP		SL	AR	15	UV
Thickness (inch)	0.030 to <0.060	0.060 to 0.50	0.060 to 0.50	0.118 to 0.50	0.118 to 0.50	0.060 to 0.50
Plastic classification (IBC Section 2606.4)	CC2	CC1	CC1	CC1	CC1	CC1

For **SI:** 1 inch = 25.4 mm.

PARAMETER	HYGARD MODELS										
	CG375	CG500	CG750	BR750	BR1000	BR1250	MS1250	EX250	EX525	EX1100	EX1300
Thickness (inch)	0.375	0.500	0.750	0.750	1.00	1.250	1.250	0.250	0.525	1.10	1.30
Plastic classification (IBC Section 2606.4)	CC1	CC1	CC1	CC2	CC1	CC1	CC2	CC1	CC1	CC1	CC1

For **SI:** 1 inch = 25.4 mm.

NATIONAL FIRE PROTECTION AGENCY (NFPA)

The National Fire Protection Agency (NFPA) has developed an independent set of building codes identified as NFPA 5000 that compete with ICC. These codes offer the industry an ANSI-accredited, consensus-based alternative to IBC.

Under NFPA, plastic building material is classified into Group A, B or C material, depending on its BTU/lb. capability.

Based on NFPA's classification of plastics, the majority of material is lumped into Group A and holds the highest fire hazard of all commodity classifications. This group includes ABS, Acetyl, Acrylic, Fiberglass, PVC , Styrene, PET , Rubber and Poly blends such as Polyethylene, Polypropylene, Polystyrene, Polyurethane, Polybutadiene and *Polycarbonate*.

NFPA references test method NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials. This method was initially written by ASTM E84 and was adopted and renamed by NFPA.

DISCLAIMER:

These suggestions and data are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use are beyond our control. We recommend that the prospective user determine the suitability of our materials and suggestions before adopting them on a commercial scale.